

WHAT IS CLAIMED IS:

1. An optical add/drop device comprising:

an optical demultiplexer for separating WDM signal light into n (n is an integer satisfying $1 < n$) optical signals having different wavelengths, said WDM signal light being obtained by wavelength division multiplexing said n optical signals;

n first optical switches each having first and second input ports and first and second output ports, said n optical signals output from said optical demultiplexer being supplied to said first input ports of said n first optical switches, respectively;

a second optical switch having k (k is a natural number) input ports and n output ports, an optical signal to be added being supplied to at least one of said k input ports of said second optical switch, said n output ports of said second optical switch being connected to said second input ports of said n first optical switches, respectively;

n regenerators connected to said first output ports of said n first optical switches, respectively;

an optical multiplexer for wavelength division multiplexing optical signals output from said n regenerators; and

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a third optical switch having n input ports and k output ports, said n input ports of said third optical switch being connected to said second output ports of said n first optical switches, respectively, an optical signal to be dropped being output from at least one of said k output ports of said third optical switch.

2. An optical add/drop device according to claim 1, further comprising k wavelength converters connected to said k output ports of said third optical switch, respectively.

3. An optical add/drop device according to claim 1, further comprising n wavelength converters connected between said n input ports of said third optical switch and said second output ports of said n first optical switches, respectively.

4. An optical add/drop device according to claim 1, further comprising n wavelength converters connected between said optical demultiplexer and said first input ports of said n first optical switches, respectively.

5. An optical add/drop device according to claim 1, wherein:

said second optical switch further has r (r is a natural number) input ports;

said third optical switch further has r output

ports; and

said optical add/drop device further comprises r links for connecting said r input ports of said second optical switch and said r output ports of said third optical switch.

6. An optical add/drop device comprising:

an optical demultiplexer for separating WDM signal light into n (n is an integer satisfying $1 < n$) optical signals having different wavelengths, said WDM signal light being obtained by wavelength division multiplexing said n optical signals;

n optical switches each having first and second input ports and first and second output ports, said n optical signals output from said optical demultiplexer being supplied to said first input ports of said n optical switches, respectively;

a first electrical switch having k (k is a natural number) input ports, s (s is a natural number) input ports, and n output ports;

k first opto/electrical converters connected to said k input ports of said first electrical switch, respectively;

n first electro/optical converters for connecting said n output ports of said first electrical switch and

said second input ports of said n optical switches,
respectively;

an optical multiplexer for wavelength division
multiplexing optical signals output from said first
output ports of said n optical switches;

a second electrical switch having n input ports, k
output ports, and s output ports;

n second opto/electrical converters for connecting
said n input ports of said second electrical switch and
said second output ports of said n optical switches,
respectively;

k second electro/optical converters connected to
said k output ports of said second electrical switch,
respectively; and

s electrical links for connecting said s input
ports of said first electrical switch and said s output
ports of said second electrical switch, respectively.

7. An optical add/drop device comprising:

an optical demultiplexer for separating WDM signal
light into n (n is an integer satisfying $1 < n$) optical
signals having different wavelengths, said WDM signal
light being obtained by wavelength division multiplexing
said n optical signals;

n optical switches each having first and second

input ports and first and second output ports, said n optical signals output from said optical demultiplexer being supplied to said first input ports of said n optical switches, respectively;

a first electrical switch having k (k is a natural number) input ports, s (s is a natural number) input ports, and n output ports;

$(k + s)$ first opto/electrical converters connected to said $(k + s)$ input ports of said first electrical switch, respectively;

n first electro/optical converters for connecting said n output ports of said first electrical switch and said second input ports of said n optical switches, respectively;

an optical multiplexer for wavelength division multiplexing optical signals output from said first output ports of said n optical switches;

a second electrical switch having n input ports, k output ports, and s output ports;

n second opto/electrical converters for connecting said n input ports of said second electrical switch and said second output ports of said n optical switches, respectively;

$(k + s)$ second electro/optical converters connected

to said $(k + s)$ output ports of said second electrical switch, respectively; and

s optical links for connecting said first opto/electrical converters respectively corresponding to said s input ports of said first electrical switch and said second electro/optical converters respectively corresponding to said s output ports of said second electrical switch, respectively.

8. An optical add/drop device adapted to first and second optical paths, comprising:

first and second optical add/drop units connected to said first and second optical paths, respectively;

an add switch for selectively adding an optical signal to any one of said first and second optical add/drop units; and

a drop switch for selectively dropping an optical signal from any one of said first and second optical add/drop units;

each of said first and second optical add/drop units comprising:

an optical demultiplexer for separating WDM signal light into n (n is an integer satisfying $1 < n$) optical signals having different wavelengths, said WDM signal light being obtained by wavelength division multiplexing

said n optical signals;

n optical switches each having first and second input ports and first and second output ports, said n optical signals output from said optical demultiplexer being supplied to said first input ports of said n optical switches, respectively;

n regenerators connected to said first output ports of said n optical switches, respectively; and

an optical multiplexer for wavelength division multiplexing optical signals output from said n regenerators;

said add switch being connected to said second input ports of said n optical switches;

said drop switch being connected to said second output ports of said n optical switches.